Find each limit algebraically

1. $\lim_{x \to 9} \frac{\sqrt{x} - 3}{x - 9}$

2. $\lim_{x \to \frac{\pi}{2}} \tan x \cos x$

$$\lim_{x \to 9} \frac{(\sqrt{x}-3)}{(x-9)} \cdot \frac{(\sqrt{x}+3)}{(\sqrt{x}+3)} = \frac{x-9}{\substack{\cancel{x\sqrt{x}+3x-9\sqrt{x}-27} \\ \sqrt{x}+3}} = \frac{1}{6}$$

1)

$$\frac{\sqrt{x}-3}{x-9}$$

$$\frac{\cancel{(\sqrt{x}-3)}}{(\sqrt{x}+3)\cancel{(\sqrt{x}-3)}}$$

$$\frac{1}{\sqrt{x}+3}$$

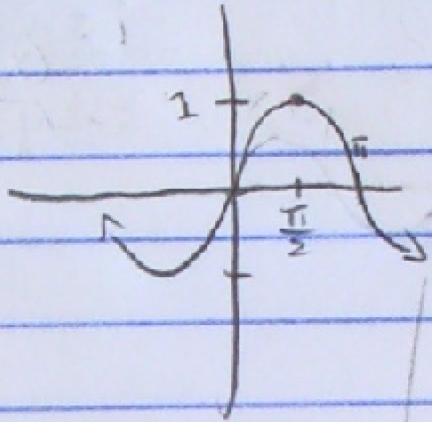
$$\frac{1}{\sqrt{9}+3}$$

$$\frac{1}{6}$$

2. $\lim_{x \to \frac{\pi}{2}} \tan x \cos x$ $\qquad \tan x = \frac{\sin x}{\cos x}$

$\lim_{x \to \frac{\pi}{2}} \frac{\sin x}{\cancel{\cos x}} \cdot \frac{\cancel{\cos x}}{1}$

$\lim_{x \to \frac{\pi}{2}} \sin x$



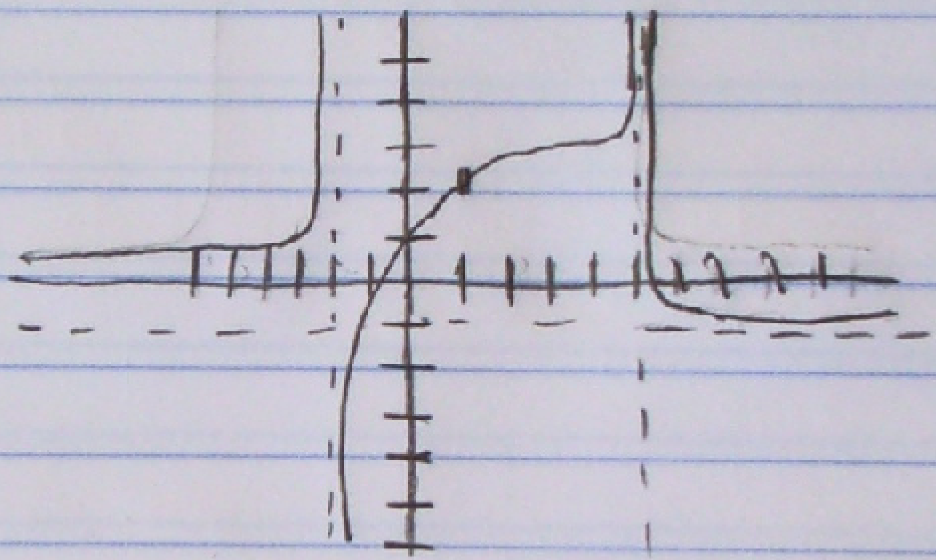
$\sin\left(\frac{\pi}{2}\right) = 1$

$\boxed{\lim_{x \to \frac{\pi}{2}} \tan x \cos x \quad f(x) = 1}$

55 • $\lim_{x \to 1} f(x) = 2$ • $\lim_{x \to 5^-} f(x) = \infty$ • $\lim_{x \to 5^+} f(x) = \infty$

• $\lim_{x \to \infty} f(x) = -1$ • $\lim_{x \to -2^+} f(x) = -\infty$ • $\lim_{x \to -2^-} f(x)$ ∞

• $\lim_{x \to -\infty} f(x) = 0$



$y = e^x - 2x$

as $x \to \infty$ end behavior e^x
right hand behavior

left hand
as $x \to -\infty$ $\frac{1}{e^x} + \underline{\underline{2x}}$ end behavior $2x$

$\frac{1}{e^x} \to 0$

$\log x$

x

x^2
x^3
x^4
$\vdots$

$e^x + 2\cancel{x^2} - \cancel{5x} \cancel{+14}$

$x \to \infty$ e^x

$x \to -\infty$

$\cancel{\frac{1}{e^x}} + 2x^2 - \cancel{5x} \cancel{+14}$

2^x
4^x
5^x

$e^{-2} = \frac{1}{e^2}$

(30) $f(x) = \dfrac{1-x}{2x^2-5x-3} \Rightarrow \dfrac{1-x}{(2x+1)(x-3)}$

V.A. $= -\frac{1}{2}, 3$

H.A. $=$ $y=0$

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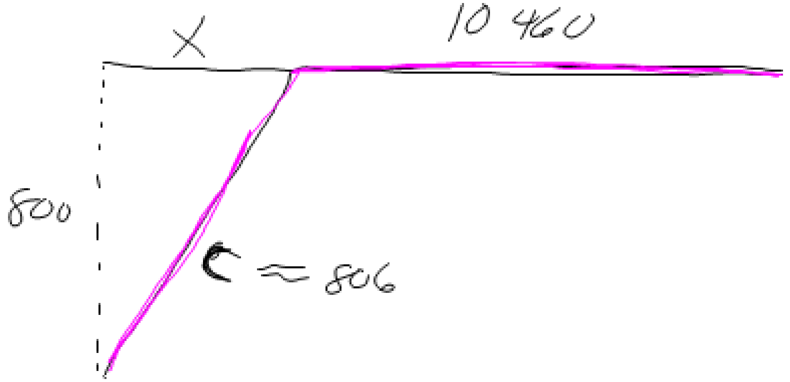
part (c) what x will minimize the cost?

$$C(x) = 100(10560 - x) + 180\left(\sqrt{x^2 + 800^2}\right)$$



$$180 \cdot 806 + 100 \cdot 10460 = \#$$

$x = 100$

$c^2 = 800^2 + x^2$